

CPC**COOPERATIVE PATENT CLASSIFICATION****Y04S****SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR INFORMATION TECHNOLOGIES FOR IMPROVING THE ELECTRICAL POWER GENERATION, TRANSMISSION, DISTRIBUTION, MANAGEMENT OR USAGE, i.e. SMART GRIDS****Systems supporting electrical power generation, transmission or distribution****Y04S 10/00****Systems supporting electrical power generation, transmission or distribution**

Y04S 10/10

- . Systems characterised by the monitored, controlled or operated power network elements or equipment ([not used, see subgroups](#))

Y04S 10/12

- .. the elements or equipments being or involving energy generation units, including distributed generation [DER] or load-side generation

Y04S 10/123

- ... the energy generation units being or involving renewable energy sources

Y04S 10/126

- ... the energy generation units being or involving electricity based vehicles, i.e. power aggregation of electric vehicles [EV] or hybrid vehicles [HEV] ([remote or cooperative charging Y04S 30/12; details associated with the interoperability in the section of transportation, e.g. vehicle recognition, authentication, identification or billing Y04S 30/14](#))

Y04S 10/14

- .. the elements or equipments being or involving energy storage units ([for systems comprising uninterruptible power supplies or standby generators Y04S 20/12](#))

Y04S 10/16

- .. the elements or equipments being or involving electric power substations

Y04S 10/18

- .. the elements or equipments being or involving switches, relays or circuit breakers, e.g. intelligent electronic devices [IED]

Y04S 10/20

- .. the elements or equipments being or involving protection elements, arrangements or systems

Y04S 10/22

- .. the element or elements being flexible AC transmission systems [FACTS] or power factor or reactive power compensating or correcting units

Y04S 10/24

- .. the elements or equipments being or involving voltage regulating units

Y04S 10/26

- .. the elements or equipments being or involving measuring units

Y04S 10/265

- ... the elements or equipments being or involving phasor measuring units [PMU]

Y04S 10/30

- . Systems characterised by state monitoring, e.g. fault, temperature monitoring, insulator monitoring, corona discharge

Y04S 10/40

- . Systems characterised by the display of information, e.g. of data or controls

Y04S 10/50

- . Systems or methods supporting the power network operation or management, involving a certain degree of interaction with the load-side end user applications ([not used, see subgroups](#))

Y04S 10/52

- .. Outage or fault management ([not used, see subgroups](#))

Y04S 10/522

- ... Fault detection or location

Y04S 10/525

- ... Power restoration

- Y04S 10/527 . . . Power quality monitoring
- Y04S 10/54 . . Management of operational aspects, e.g. planning, load or production forecast, maintenance, construction, extension
- Y04S 10/545 . . . Computing methods or systems for efficient or low carbon management or operation of electric power systems
- Y04S 10/56 . . Supply chain or logistics
- Y04S 10/58 . . Financial aspects
- Y04S 10/60 . . Reporting; Information providing; Statistics or analysis

Systems supporting the management or operation of end-user stationary applications, including also the last stages of power distribution and the control, monitoring or operating management systems at local level

Y04S 20/00 Systems supporting the management or operation of end-user stationary applications, including also the last stages of power distribution and the control, monitoring or operating management systems at local level

- Y04S 20/10 . System characterised by the monitored, controlled or operated end-user elements or equipments ([not used, see subgroups](#))
- Y04S 20/12 . . the elements or equipments being or involving energy storage units, uninterruptible power supply [UPS] systems or standby or emergency generators involved in the last power distribution stages ([energy storage units involved in power generation, transmission and distribution Y04S 10/14; uninterruptible power supply systems or standby or emergency generators as end-user application Y04S 20/248](#))
- Y04S 20/14 . . The elements or equipments being or involving protection elements, switches, relays or circuit breakers
- Y04S 20/16 . . The elements or equipments being or involving power plugs, sockets, adapters or power strips
- Y04S 20/18 . . The element or elements being a direct current power network, grid or distribution line
- Y04S 20/20 . End-user application control systems ([not used, see subgroups](#))
- Y04S 20/22 . . The system characterised by the aim of the control ([not used, see subgroups](#))
- Y04S 20/221 . . . General power management systems
- Y04S 20/222 . . . Demand response systems, e.g. load shedding, peak shaving
- Y04S 20/224 Curtailment; Interruptions; Retail price-responsive demand
- Y04S 20/225 . . . The system entering an energy saving mode, i.e. sleep, low-power or standby modes
- Y04S 20/227 . . . Domotics or building automation systems
- Y04S 20/228 Characterised by involving a home automation communication network
- Y04S 20/24 . . The system characterised by the end-user application ([not used, see subgroups](#))
- Y04S 20/242 . . . the end-user application being or involving home appliances
- Y04S 20/244 the home appliances being or involving heating ventilating and air conditioning [HVAC] units
- Y04S 20/246 the system involving the remote operation of lamps or lighting equipment
- Y04S 20/248 . . . the end-user application involving uninterruptible power supply [UPS] systems or standby or emergency generators ([for uninterruptible power supply systems or standby or emergency generators in the last power distribution stages](#))

Y04S 20/12)

- Y04S 20/30 . Smart metering
- Y04S 20/32 . . Systems characterised by remote reading
- Y04S 20/322 . . . from a fixed location
- Y04S 20/325 . . . from a mobile location
- Y04S 20/327 . . . The remote reading system including mechanisms for turning on/off the supply
- Y04S 20/34 . . Systems which determine the environmental impact of user behavior
- Y04S 20/36 . . Methods or devices for detecting or reporting abnormalities, e.g. faults, outages, leaks
- Y04S 20/38 . . Identification of individual loads by analysing current or voltage waveforms
- Y04S 20/40 . . Displaying of usage with respect to time, e.g. monitoring evolution of usage, relating usage and weather conditions
- Y04S 20/42 . . Utility meters which are networked together, e.g. within a single building
- Y04S 20/44 . . Displaying utility price or cost
- Y04S 20/46 . . Remote display of meters readings
- Y04S 20/48 . . Methods for determining the topology of meters in a network
- Y04S 20/50 . . Retrofitting of installed meters
- Y04S 20/52 . . Systems oriented to metering of generated energy or power
- Y04S 20/525 . . . Monitoring the performance of renewable electricity generating systems, i.e. of solar panels

Systems supporting specific end-user applications in the sector of transportation**Y04S 30/00 Systems supporting specific end-user applications in the sector of transportation**

- Y04S 30/10 . Systems supporting the interoperability of electric or hybrid vehicles ([not used, see subgroups](#))
- Y04S 30/12 . . Remote or cooperative charging
- Y04S 30/14 . . Details associated with the interoperability, e.g. vehicle recognition, authentication, identification or billing

Communication or information technology specific aspects supporting electrical power generation, transmission, distribution or end-user application management**Y04S 40/00 Communication or information technology specific aspects supporting electrical power generation, transmission, distribution or end-user application management**

- Y04S 40/10 . Communication technology specific aspects ([not used, see subgroups](#))
- Y04S 40/12 . . Details of the transmission structure or support between the monitoring, controlling or managing units and monitored, controlled or operated electrical equipment ([not used, see subgroups](#))
- Y04S 40/121 . . . Using the power network as support for the transmission
- Y04S 40/122 Using pulsed signals
- Y04S 40/123 Using modification of a parameter of the network power signal

- Y04S 40/124 . . . Using a data transmission bus
- Y04S 40/125 . . . Using phone lines
- Y04S 40/126 . . . Using wireless data transmission
- Y04S 40/127 by means of mobile telephony
- Y04S 40/128 . . . Using Internet
- Y04S 40/14 . . Aspects related to the treatment or conditioning of data or signals ([not used, see subgroups](#))
- Y04S 40/143 . . . Associated to the communication via dedicated transmission supports
- Y04S 40/146 . . . Associated to the communication via the power transmission network
- Y04S 40/16 . . Details of management of the overlaying communication network between the monitoring, controlling or managing units and monitored, controlled or operated electrical equipments ([not used, see subgroups](#))
 - Y04S 40/162 . . . related to configuration or provisioning
 - Y04S 40/164 . . . related to network topology
 - Y04S 40/166 . . . related to fault management
 - Y04S 40/168 . . . for performance monitoring
- Y04S 40/20 . Information technology specific aspects ([not used, see subgroups](#))
- Y04S 40/22 . . Computer aided design [CAD]; Simulation; Modelling
- Y04S 40/24 . . Arrangements for network security or for protecting computers or computer systems against unauthorised activity, e.g. cyber security

Market activities related to the operation of systems integrating technologies related to power network operation and communication or information technologies

- Y04S 50/00** **Market activities related to the operation of systems integrating technologies related to power network operation and communication or information technologies**
- Y04S 50/10 . Energy trading, including energy flowing from end-user application to grid
- Y04S 50/12 . Billing, invoicing, buying or selling transactions or other related activities, e.g. cost or usage evaluation
- Y04S 50/14 . Marketing, i.e. market research and analysis, surveying, promotions, advertising, buyer profiling, customer management or rewards